



## UT6302

Power MOSFET

### P-CHANNEL ENHANCEMENT MOSFET

#### DESCRIPTION

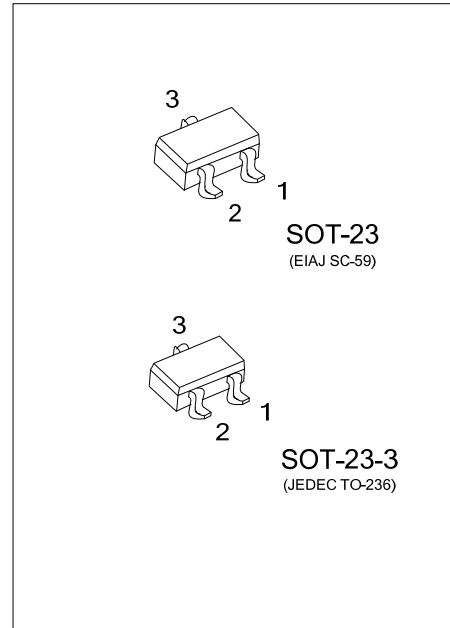
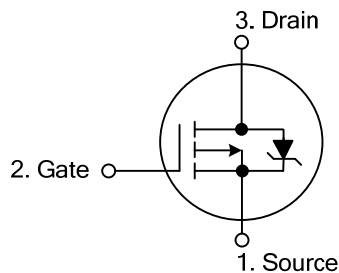
The UTC **UT6302** is a power MOSFET offering the customers efficient and reliable performance.

The UTC **UT6302** is ideal for thin application environments, such as portable electronics and PCMCIA cards.

#### FEATURES

- \* Extremely-Low On-Resistance
- \* Fast Switching Speed

#### SYMBOL



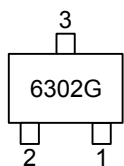
#### ORDERING INFORMATION

| Ordering Number | Package  | Pin Assignment |   |   | Packing   |
|-----------------|----------|----------------|---|---|-----------|
|                 |          | 1              | 2 | 3 |           |
| UT6302G-AE2-R   | SOT-23-3 | S              | G | D | Tape Reel |
| UT6302G-AE3-R   | SOT-23   | S              | G | D | Tape Reel |

Note: Pin Assignment: S: Source G: Gate D: Drain

|   |  |
|---|--|
| <p>UT6302G-AE3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) AE2: SOT-23-3, AE3: SOT-23</p> <p>(3) G: Halogen Free and Lead Free</p> |
|---|--|

#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER   | SYMBOL    | RATINGS    | UNIT                 |
|---|-----------|------------|----------------------|
| Drain-Source Voltage  | $V_{DSS}$ | -20        | V                    |
| Gate-Source Voltage   | $V_{GSS}$ | $\pm 12$   | V                    |
| Continuous Drain Current ( $V_{GS} = -4.5\text{V}$ , $T_A = 25^\circ\text{C}$ ) | $I_D$     | -0.78      | A                    |
| Pulsed Drain Current (Note 2)   | $I_{DM}$  | -4.9       | A                    |
| Peak Diode Recovery $dv/dt$ (Note 3)  | $dv/dt$   | -5.0       | V/nS                 |
| Power Dissipation ( $T_A = 25^\circ\text{C}$ )                                  | $P_D$     | 540        | mW                   |
| Linear Derating Factor above $25^\circ\text{C}$                                 |           | 4.3        | mW/ $^\circ\text{C}$ |
| Junction Temperature  | $T_J$     | +150       | $^\circ\text{C}$     |
| Storage Temperature   | $T_{STG}$ | -55 ~ +150 | $^\circ\text{C}$     |

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Pulse width limited by  $T_{J(MAX)}$

3.  $I_{SD} \leq -0.61\text{A}$ ,  $di/dt \leq 76\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J = 150^\circ\text{C}$

■ THERMAL DATA

| PARAMETER           | SYMBOL        | RATINGS | UNIT                      |
|---------------------|---------------|---------|---------------------------|
| Junction to Ambient | $\theta_{JA}$ | 230     | $^\circ\text{C}/\text{W}$ |

Note: Surface Mounted on FR-4 Board,  $t \leq 5\text{sec}$ .

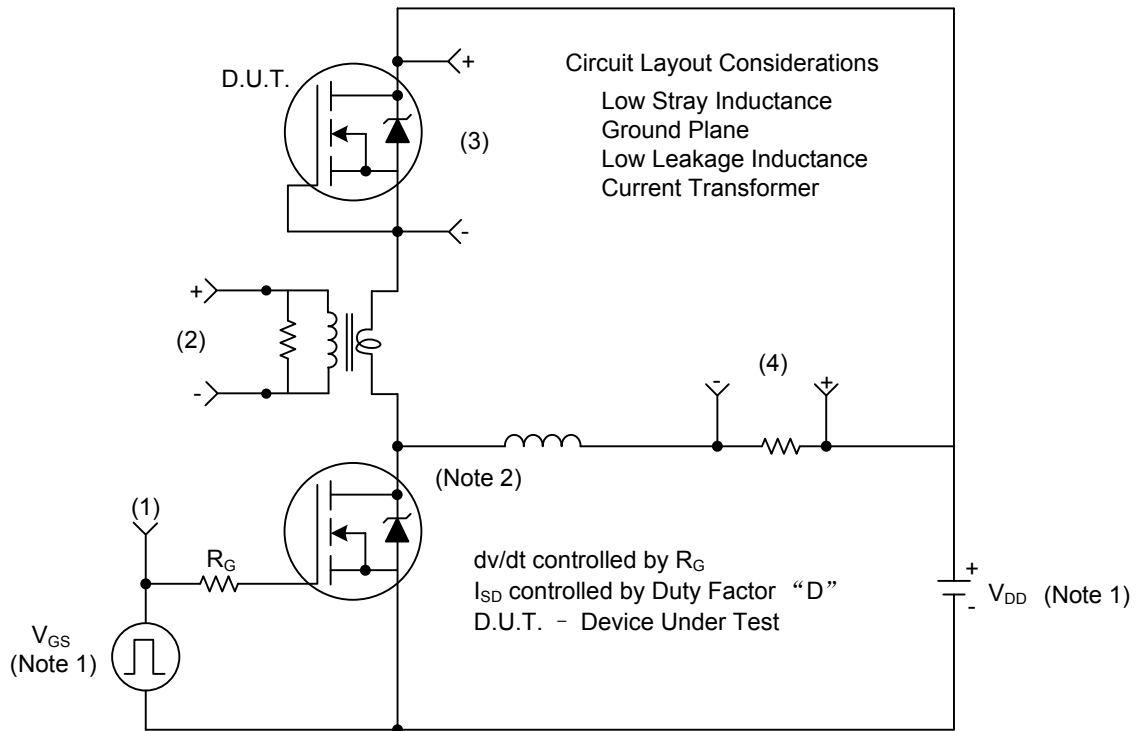
■ ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER  | SYMBOL                       | TEST CONDITIONS  | MIN   | TYP  | MAX       | UNIT                 |
|--|------------------------------|--|-------|------|-----------|----------------------|
| <b>OFF CHARACTERISTICS</b>                                 |                              |  |       |      |           |                      |
| Drain-Source Breakdown Voltage                             | $BV_{DSS}$                   | $V_{GS} = 0\text{V}$ , $I_D = -250\ \mu\text{A}$   | -20   |      |           | V                    |
| Drain-Source Leakage Current                               | $I_{DSS}$                    | $V_{DS} = -16\text{V}$ , $V_{GS} = 0\text{V}$  |       |      | -1.0      | $\mu\text{A}$        |
| Gate-Source Leakage Current                                | $I_{GSS}$                    | $V_{GS} = \pm 12\text{V}$ , $V_{DS} = 0\text{V}$   |       |      | $\pm 100$ | nA                   |
| Drain-Source Breakdown Voltage                             | $\Delta BV_{DSS}/\Delta T_J$ | $I_D = -1\text{mA}$ , Reference to $25^\circ\text{C}$  |       | -4.9 |           | mV/ $^\circ\text{C}$ |
| <b>ON CHARACTERISTICS</b>                                  |                              |  |       |      |           |                      |
| Gate Threshold Voltage                                     | $V_{GS(TH)}$                 | $V_{DS} = V_{GS}$ , $I_D = -250\ \mu\text{A}$  | -0.70 |      | -1.5      | V                    |
| Static Drain-Source On-Resistance                          | $R_{DS(ON)}$                 | $V_{GS} = -4.5\text{V}$ , $I_D = -0.61\text{A}$ (Note 2)   |       |      | 0.60      | $\Omega$             |
|  |                              | $V_{GS} = -2.7\text{V}$ , $I_D = -0.31\text{A}$ (Note 2)   |       |      | 0.90      | $\Omega$             |
| <b>DYNAMIC PARAMETERS</b>                                  |                              |  |       |      |           |                      |
| Input Capacitance  | $C_{ISS}$                    | $V_{DS} = -15\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1.0\text{MHz}$                                      |       | 97   |           | pF                   |
| Output Capacitance   | $C_{OSS}$                    |  |       | 53   |           | pF                   |
| Reverse Transfer Capacitance                               | $C_{RSS}$                    |  |       | 28   |           | pF                   |
| <b>SWITCHING PARAMETERS</b>                                |                              |  |       |      |           |                      |
| Total Gate Charge  | $Q_G$                        | $V_{GS} = -4.5\text{V}$ , $V_{DS} = -16\text{V}$<br>$I_D = -0.61\text{A}$ (Note 1, 2)                    |       | 2.4  | 3.6       | nC                   |
| Gate Source Charge   | $Q_{GS}$                     |  |       | 0.56 | 0.84      | nC                   |
| Gate Drain Charge  | $Q_{GD}$                     |  |       | 1.0  | 1.5       | nC                   |
| Turn-ON Delay Time   | $t_{D(ON)}$                  | $V_{DD} = -10\text{V}$ , $I_D = -0.61\text{A}$ ,<br>$R_G = 6.2\ \Omega$ , $R_D = 16\ \Omega$ (Note 1, 2) |       | 13   |           | nS                   |
| Turn-ON Rise Time  | $t_R$                        |  |       | 18   |           | nS                   |
| Turn-OFF Delay Time  | $t_{D(OFF)}$                 |  |       | 22   |           | nS                   |
| Turn-OFF Fall-Time   | $t_F$                        |  |       | 22   |           | nS                   |
| <b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>      |                              |  |       |      |           |                      |
| Drain-Source Diode Forward Voltage                         | $V_{SD}$                     | $I_S = -0.61\text{A}$ , $V_{GS} = 0\text{V}$   |       |      | -1.2      | V                    |
| Maximum Continuous Drain-Source Diode Forward Current      | $I_S$                        |  |       |      | -0.54     | A                    |
| Maximum Pulsed Drain-Source Diode Forward Current (Note 1) | $I_{SM}$                     |  |       |      | -4.9      | A                    |
| Reverse Recovery Time                                      | $t_{rr}$                     | $T_J = 25^\circ\text{C}$ , $I_F = -0.61\text{A}$ ,<br>$di/dt = 100\text{A}/\mu\text{s}$ (Note 2)         |       | 35   | 53        | nS                   |
| Reverse Recovery Charge                                    | $Q_{RR}$                     |  |       | 26   | 39        | nC                   |

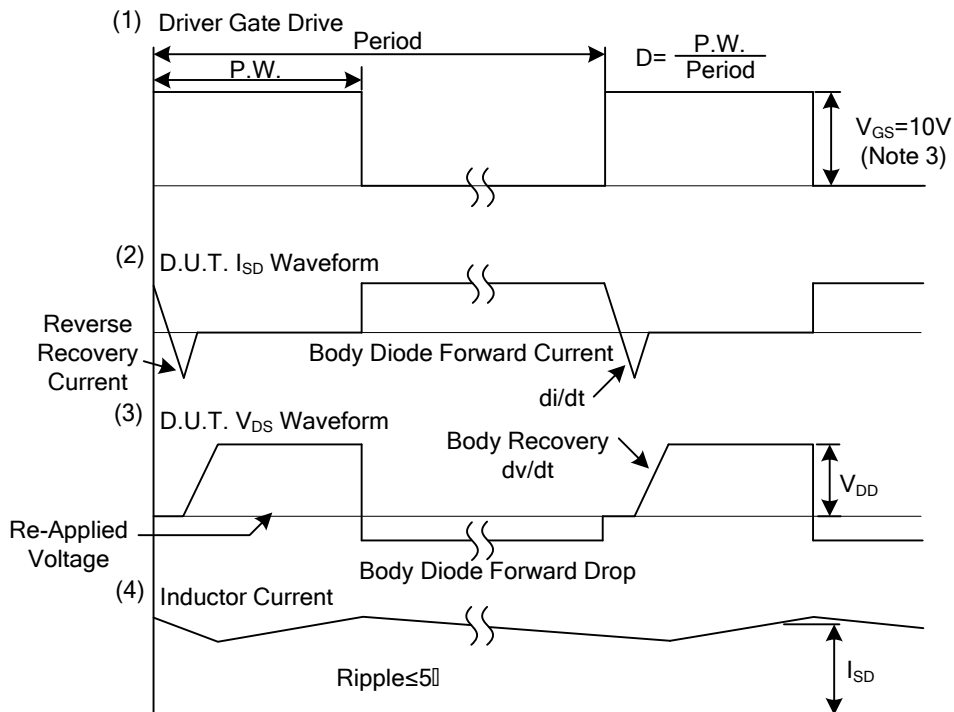
Notes: 1. Repetitive Rating; Pulse width limited by  $T_{J(MAX)}$ .

2. Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

■ TEST CIRCUITS AND WAVEFORMS



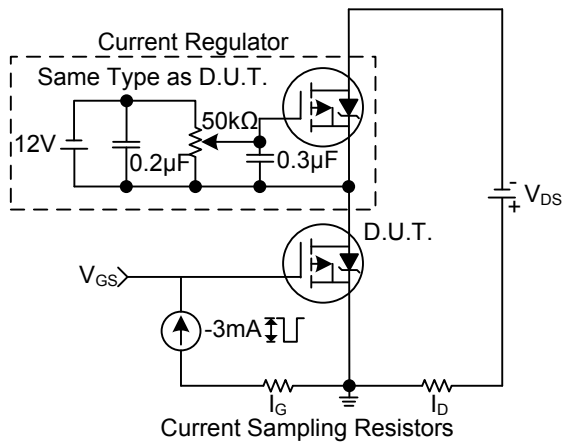
Peak Diode Recovery dv/dt Test Circuit



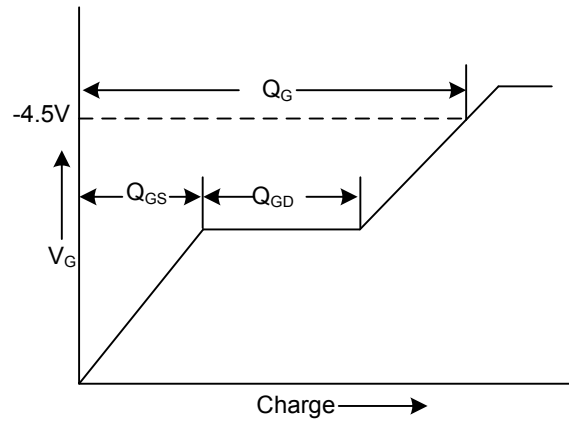
Peak Diode Recovery dv/dt Waveforms

- Notes: 1. Reverse Polarity for P-Channel
- 2. Use P-Channel Driver for P-Channel Measurements
- 3.  $V_{GS}=5.0V$  for Logic Level and 3V Drive Devices

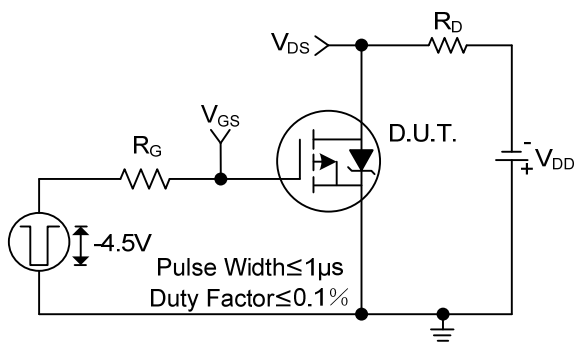
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



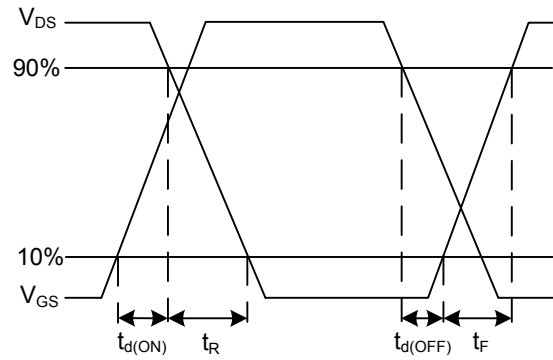
Gate Charge Test Circuit



Gate Charge Waveforms

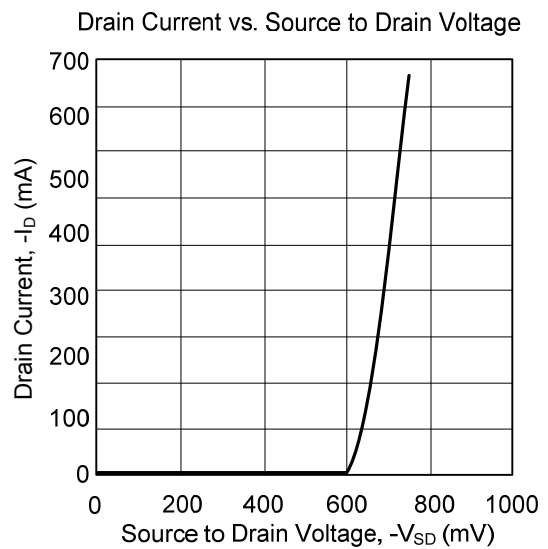
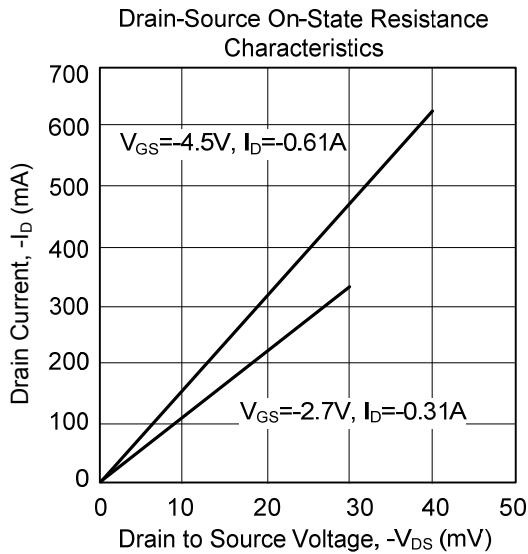
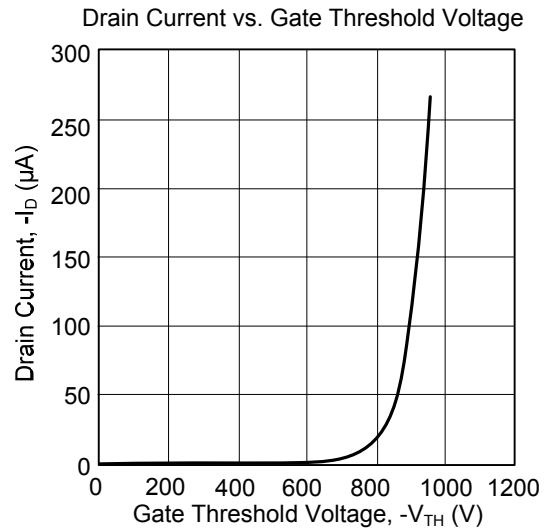
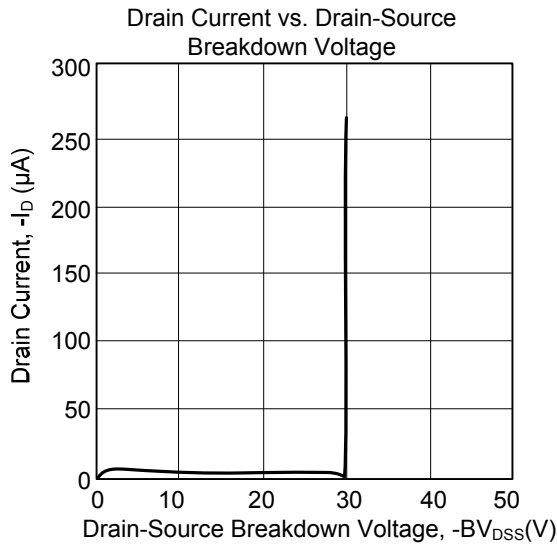


Switching Time Test Circuit



Switching Time Waveforms

■ TYPICAL CHARACTERISTICS



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